

Technical Bulletin, Unsolicited Transmissions of Custom Modbus[®] Data Packets



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NOTE: User Manual Reference - This Technical Bulletin complements the information contained in the User Manual, specifically Volume 3, Chapter 4 “Modbus® Protocol Implementation”, and is applicable to all revision 74+.

Unsolicited Transmissions are used for OMNI Flow Computers to transmit custom data packets via an RS-232-C serial port without a poll. This feature is especially useful when communicating via VSAT satellite systems. Modbus protocol Function Code 67 has been assigned to this function exclusively for OMNI Flow Computers.

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Scope

This Technical Bulletin applies to all firmware revisions xx.74 and above of OMNI 6000/OMNI 3000 Flow Computers.

Abstract

Unsolicited transmissions are used to transmit 'Custom Modbus Data Packets' from a selected flow computer RS-232-C serial port without it being polled for data by the receiving device. Modbus protocol Function Code 67 was assigned for this feature, which allows the receiving device to discriminate between a transmission without a poll (unsolicited) and a normal Modbus read.

This function, among other uses, was designed for communicating via VSAT satellite systems where operating cost is directly proportional to RF bandwidth used. In communications via satellite, polled transmissions are much more costly than unsolicited transmissions. Typically, the device requesting data (master) would poll the flow computer to transmit the data to it through a satellite link. This would require a signal from the master device to the flow computer and yet another from the flow computer back to the requesting device. Whereas with unsolicited transmissions, the flow computer can be configured to transmit Modbus custom data packets at specified time intervals, when a certain event occurs, or by some other transmission triggering cause, without the master device having to poll the flow computer for such data. In this manner, only one (1) signal is transmitted via satellite; i.e., from the flow computer to the master device

Custom Modbus® Data Packets

NOTE: Many point numbers were left unused when numbering the variables within the database. This allows for future growth and different application data. Without custom data packets many polls would be required to retrieve data distributed throughout the database. The custom data packet allows you to concatenate or join different groups or sets of data in any order and of any data type into one (1) message response. These custom packets are located at points 0001, 0201, and 0401 in the database.

For more information refer to 2.5.18 and 4.6 in Volume 3, and 1.1, 1.3.14 and 2.1 in Volume 4 of the User Manual.

Custom Modbus Data Packets are provided to reduce the number of polls needed to read multiple variables which may be in different areas of the database. Groups of consecutive database points of any type of data can be joined together into one (1) packet by entering each data group's starting database index number. The number of data bytes in a custom packet which will be used for unsolicited transmissions cannot exceed 248 in RTU mode or 496 in ASCII mode.

Prerequisites for Using Unsolicited Transmissions of Custom Data Packets

Before you can configure your flow computer to realize unsolicited transmissions of custom Modbus data packets, you must have the following:

- User-customized Modbus driver for receiving device
- Compatible serial communications capability

User-customized Modbus Driver

Various communication master devices can be connected to the OMNI Flow Computer via Modbus serial link including, but not limited to, front-end supervisory control and data acquisition (SCADA) system devices. In order for these devices to be able to identify and read unsolicited transmissions of OMNI Flow Computer custom data packets, the user must develop a custom driver capable of identifying the Modbus protocol Function Code 67; which is an OMNI proprietary function. The custom driver must then be installed in the SCADA or other receiving device and verified for adequate performance.

Compatible Serial Communications

Both the OMNI Flow Computer and the receiving device must be equipped with appropriate RS-232 compatible or RS-485 serial ports configured for Modbus protocol implementation. The OMNI Flow Computer has several hardware and software options for RS-232 or RS-485 compatible serial data links (refer to the User Manual for details).

Modbus® Protocol Implementation of OMNI Proprietary Function Code 67: Transmit Unsolicited Custom Data Packet

A typical unsolicited transmission Modbus protocol message format using Function Code 67 per Table 1.

Table 1. Modbus Protocol Message Format using Function Code 67

DEVICE ADDRESS	FUNCTION CODE 67	BYTE COUNT	CUSTOM PACKET ADDRESS	DATA	CRC ERROR CHECK BYTES
XX	43 _{HEX}	XX	XXXX _{HEX}	DD DD ...DD DD	CRC CRC

Device Address:	The address that identifies the OMNI Flow Computer that is transmitting unsolicited data.
Function Code 67:	Represented in hexadecimal value as 43.
Byte Count:	The number of bytes of the data field (maximum of 248 bytes in RTU mode or 496 bytes in ASCII mode).
Custom Packet Address:	The flow computer database address of the custom Modbus data packet, represented in hexadecimal value (Table 2):

**Table 2. Custom Modbus Data Packet Addresses
Hexadecimal Equivalents**

PACKET NUMBER	PACKET ADDRESS	HEXADECIMAL EQUIVALENT
#1	0001	0001
#2	0201	00C9
#3	0401	0191

Data:	The actual flow computer data transmitted without a poll to the receiving device.
CRC Error Check Bytes:	Used to check the message for errors.

For more information on Modbus protocol implementation, refer to Chapter 4, Volume 3 of the User Manual.

Configuring Your Flow Computer for Unsolicited Transmissions of Custom Data Packets

To activate unsolicited transmissions you must enable any of the following 'edge triggered' command points which cause the appropriate custom Modbus data packet' to be transmitted out of the selected serial port without the serial port being polled for data (Table 3):

Table 3. Flow Computer Modbus Database Points for Unsolicited Transmissions

ADDRESS	UNSOLICITED TRANSMISSION TYPE
2701	Custom Data Packet #1 via Serial Port #1
2702	Custom Data Packet #2 via Serial Port #1
2703	Custom Data Packet #3 via Serial Port #1
2704	Custom Data Packet #1 via Serial Port #2
2705	Custom Data Packet #2 via Serial Port #2
2706	Custom Data Packet #3 via Serial Port #2
2707	Custom Data Packet #1 via Serial Port #3
2708	Custom Data Packet #2 via Serial Port #3
2709	Custom Data Packet #3 via Serial Port #3
2710	Custom Data Packet #1 via Serial Port #4
2711	Custom Data Packet #2 via Serial Port #4
2712	Custom Data Packet #3 via Serial Port #4

Example

The following user-programmable variables are an example of programming a timer for every fifteen (15) seconds which triggers the unsolicited transmission of a custom Modbus data packet:

7025: 7026) 7026 = # -15

7026: 7026 + # 0.5

The following Boolean statement is an example of an unsolicited transmission where every fifteen (15) seconds the data contained in Custom Modbus Data Packet #3 will be transmitted without a poll via the flow computer's Serial Port #2 to the receiving device:

1025: 2706 = 7026

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